GUJARAT TECHNOLOGICAL UNIVERSITY
BIO-TECHNOLOGY
B. E. SEMESTER: VII

Subject Name: **Genomics And Proteomics**
Subject Code: **170405**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	0	2	5	70	30	30	20

Unit-1 :

Sr. No	Course Content	Total Hrs.
1.	**Basic Genomics:** • Definition, historical background and branches of genomics. • Eukaryotic genome organization & packing of nuclear DNA in eukaryotes • Prokaryotic genome organization, human genomic variations • Overview of Organization of genomes in organelles (mitochondria & chloroplast) • Various techniques of genome sequencing, Various applications of genome analysis and genomics • Overviews of Natural Gene circuits, concept of Synthetic Biology	12
2.	**Advance Genomics** • Nucleotide databases – Generalized and Specialized. • Gene Prediction methods and Tools • Comparative Genomics of Prokaryotes, eukaryotes and Organelles with view point of evolution and Medicine • Definition, construction and applications of Expressed Sequence Tag (EST) • Definition, construction and applications of DNA microarray(cancer and Genomic Microarrays, healthcare applications), Biomedical Genome research • Serial Analysis of Gene Expression (SAGE)	12

Unit-2:

3.	**Basic Proteomics** • Definition, historical background and branches of proteomics, Concept of proteome in eukaryotes and prokaryotes • Protein expression patterns: proteomics, Protein interaction network • Principle, Procedure, image analysis and application of 2D-PAGE • Principle, procedure, types, data analysis and applications of Mass spectroscopy • Tools and databases used for Proteomics data analysis	12
4.	**Advance Proteomics** • Protein Databases- Primary, Secondary and Tertiary. • Principle and procedure involved in automation of proteomics analysis, Databases and tools used in automation of proteomics analysis • Definition, construction and applications of protein microarray (protein chips) • Principle, procedure and applications of Rational Drug Designing (RDD) • Protein structure prediction and Visualization • Protein Modeling, docking and simulation	12

List of Practicals:

Practicals based on the following topics and introducing the concerned tools is as under:

1. Introduction of Home Page NCBI& Sequence Retrieval System DDBJ,PDB.
2. Sequence Retrieval System-Entrenz
3. Sequence Analysis
4. Multiple Sequence Alignment-CLUSTALW
5. Sequence Analysis Software
6. Post Translational Modification
7. Secondary Structure Prediction
8. Visualization Software
9. Generating Drug Molecule
10. Primer Design
11. Introduction to simulation software

Text Book:

1. Discovering Genomics, Proteomics and Bioinformatics , A.Malcolm Campbell and L.J.Heyer, Second Edition, Pearson

Reference Books:

1. Introduction to Protein science: Architecture, Function and Genomics,Arther M. Lesk , OXFORD University Press, Second Edition
2. Primrose and Twyman R.M: Principles of Genome analysis: Blackwell publication
3. Proteomics: from protein sequence to function, Pennington SR, Dunn MJ, Viva Books Private Ltd.
4. Genomics and Proteomics: Functional and Computational Aspects by Sandor Suhai
   (Editor) (September 2000).
5. Creighton TE, Proteins, Freeman WH, Second Edition 1993.
6. Branden C, Tooze R, " Introduction of Protein Structure", Garland, 1993.